

Cracked and Burned – The Price to Pay for Hanging Out There all Day

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ACADEMICS • RESEARCH • EXTENSION


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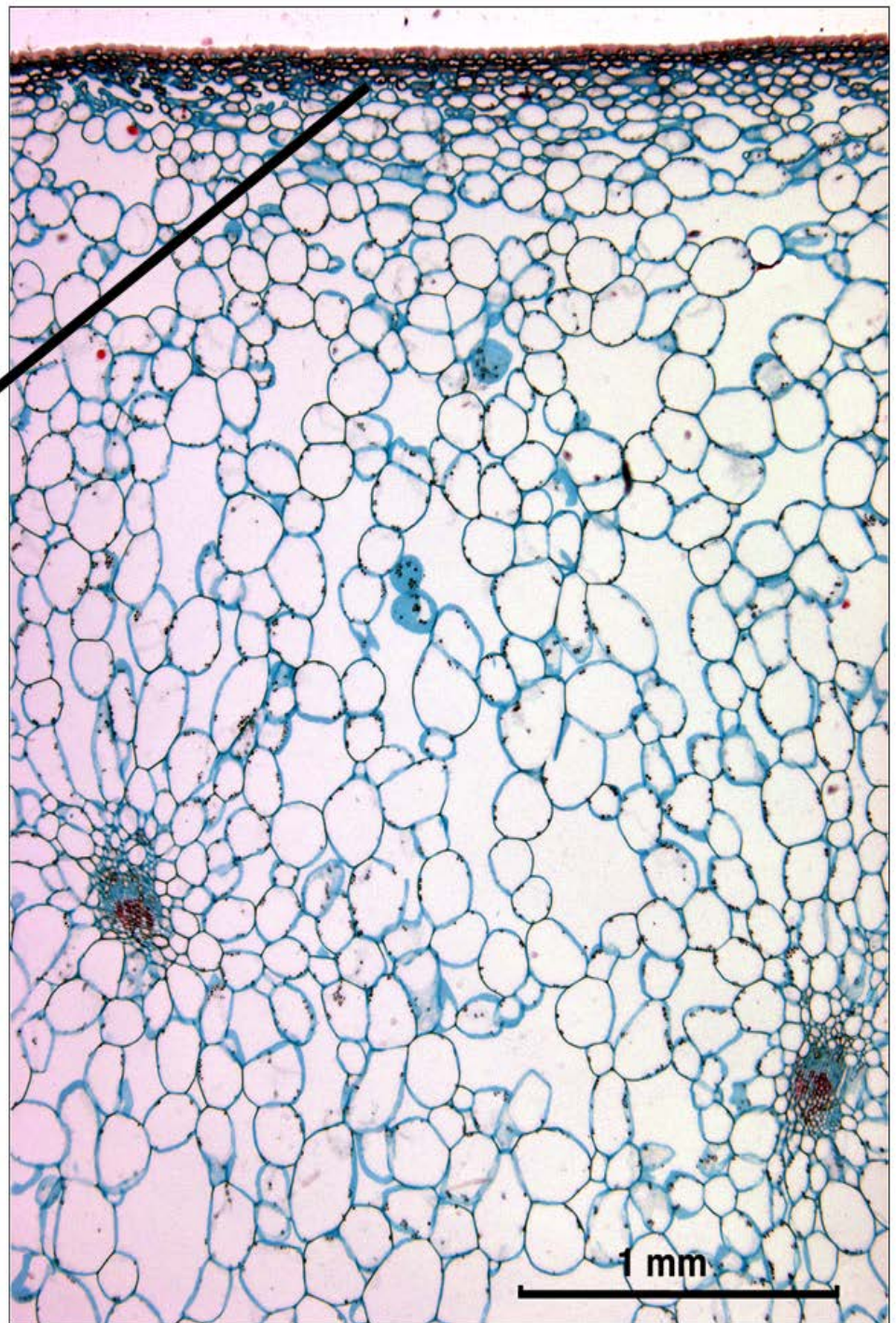
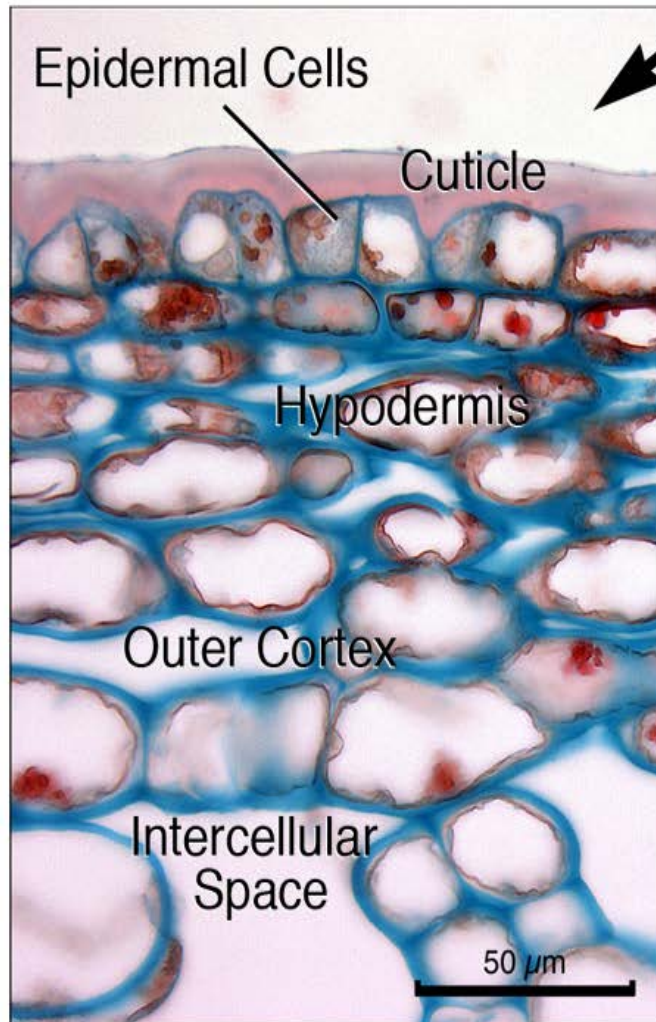
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Many Types of Russet Develop Very Early in the Season

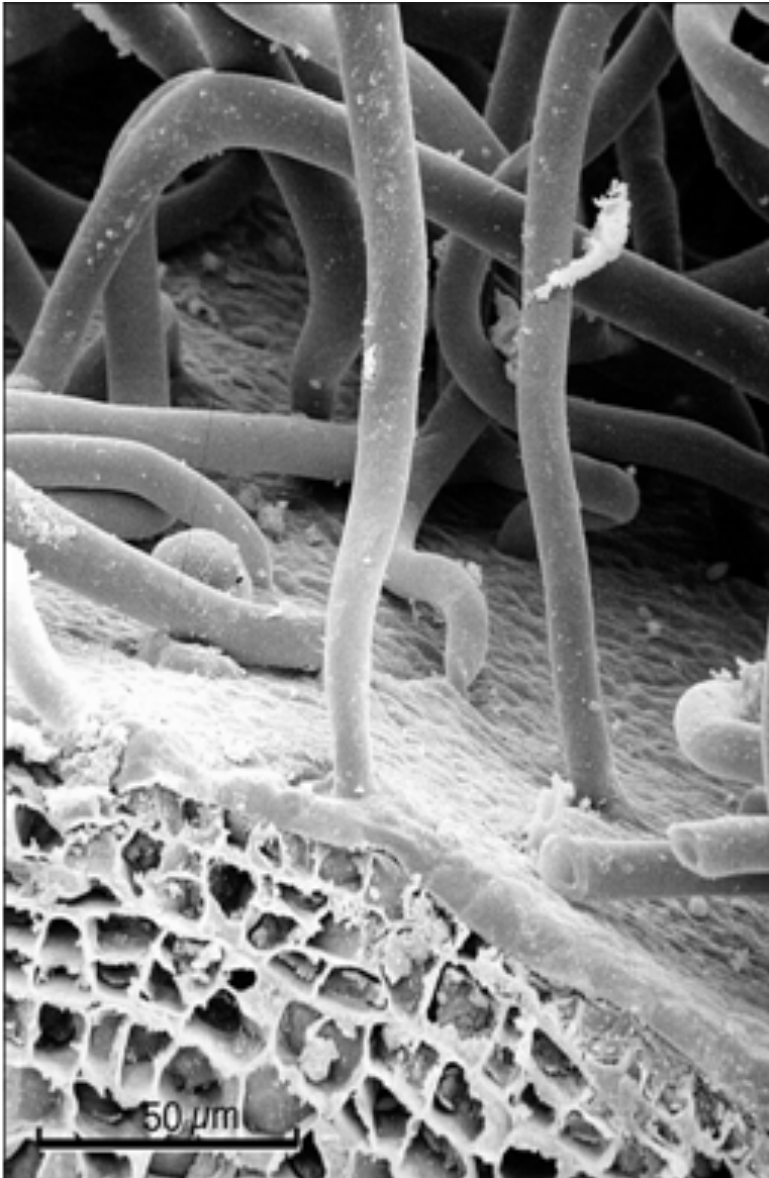


'Rome' — Skin and Outer Cortex in Mature Fruit

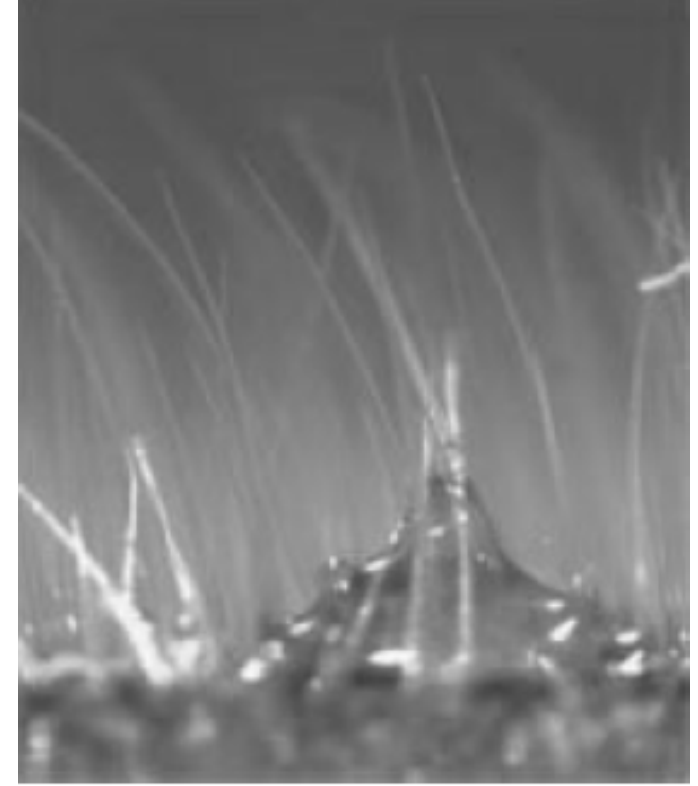
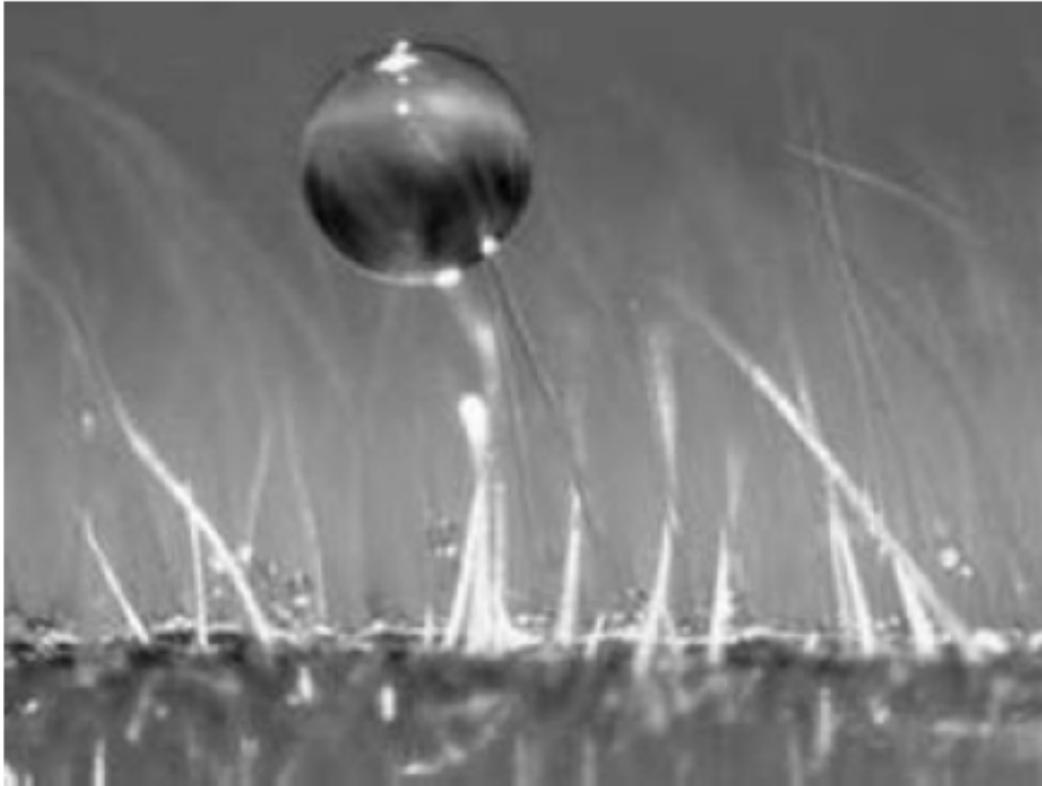
Source: Goffinet



Apple Fruit Surface 7 Days After Bloom



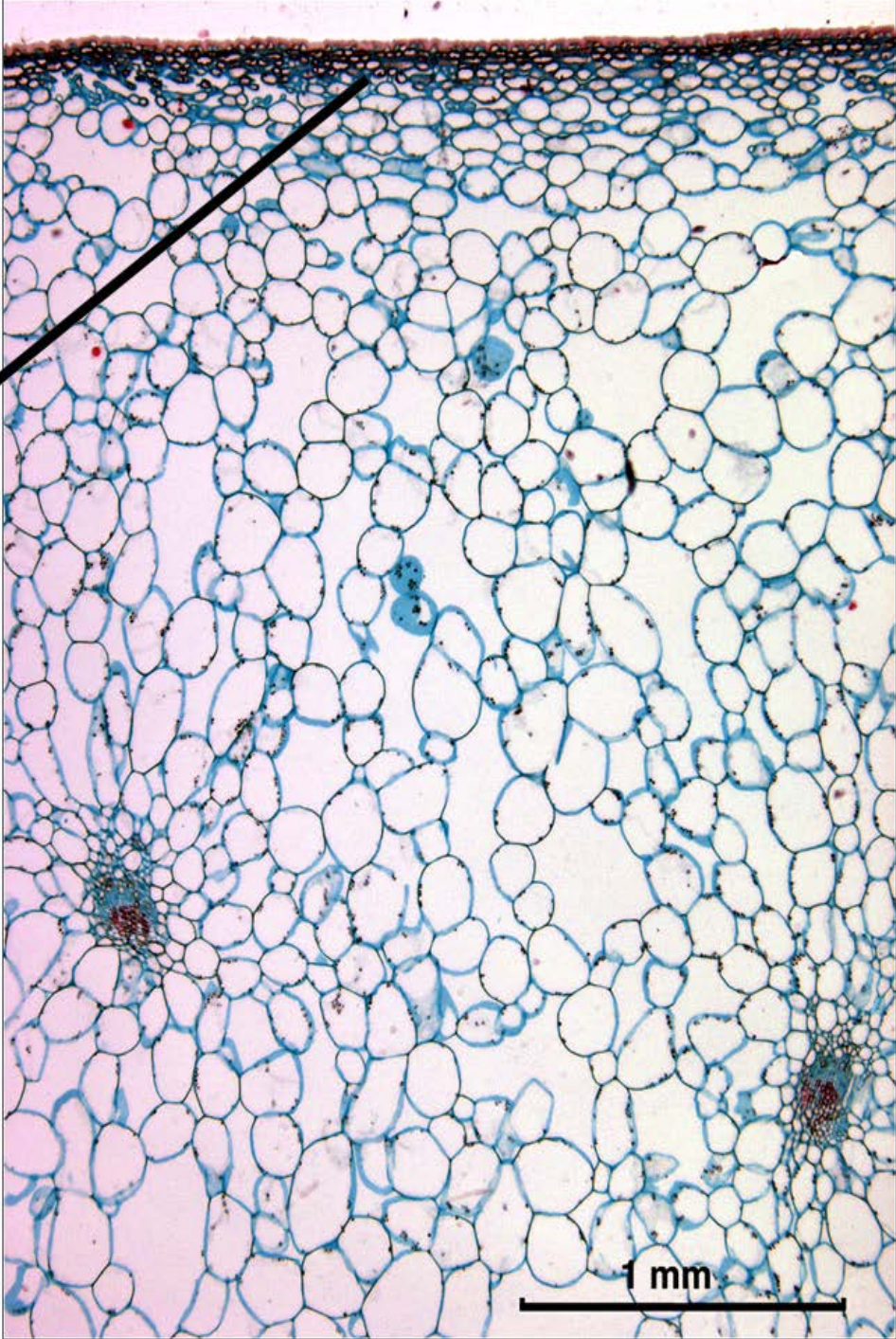
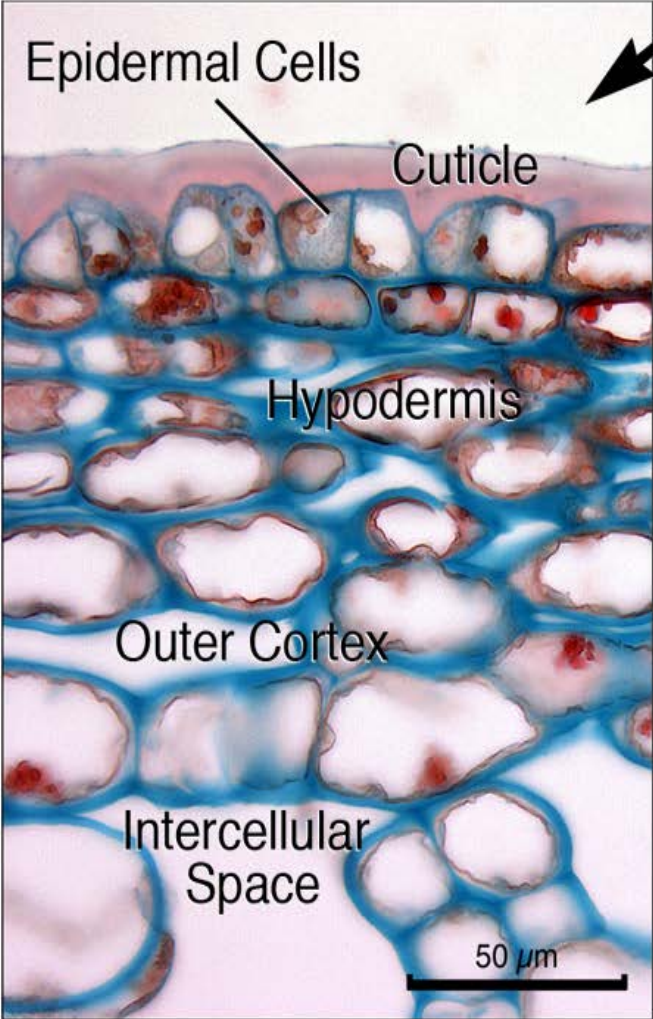
Covered in unicellular hairs
called trichomes



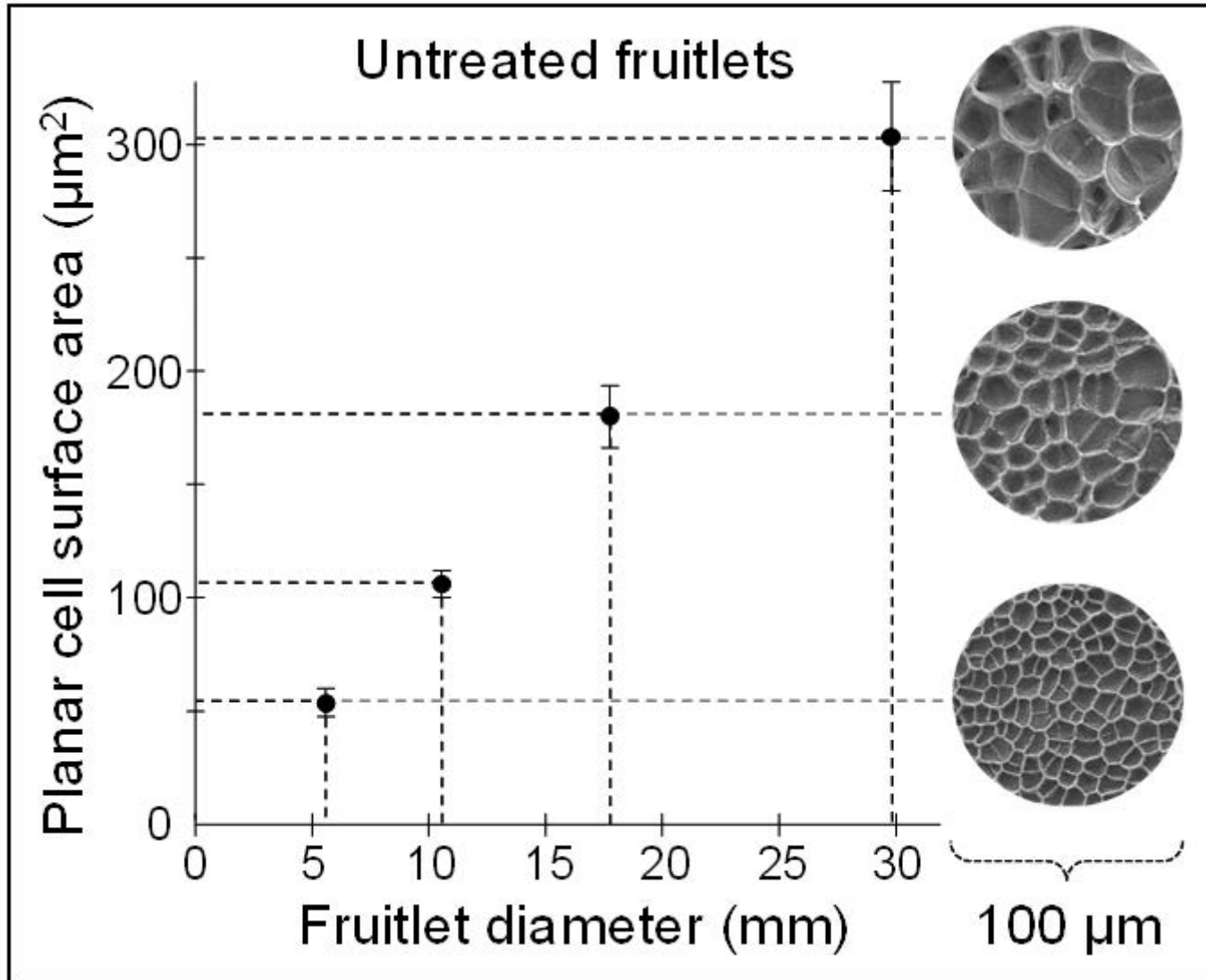
Spray droplet on a hairy Pelargonium leaf without (left) and with (right) a surfactant

'Rome' – Skin and Outer Cortex in Mature Fruit

Source: Goffinet

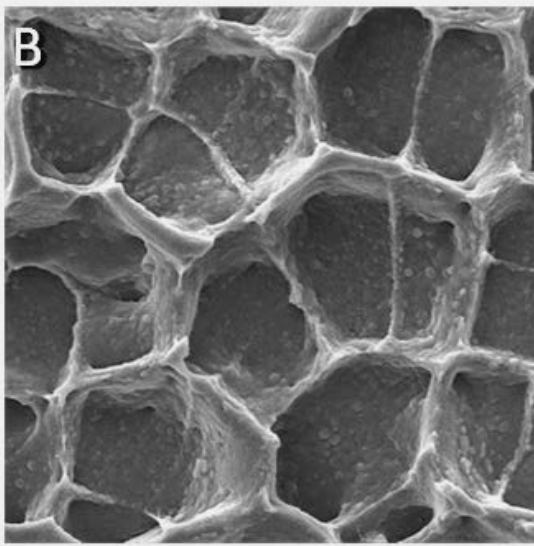
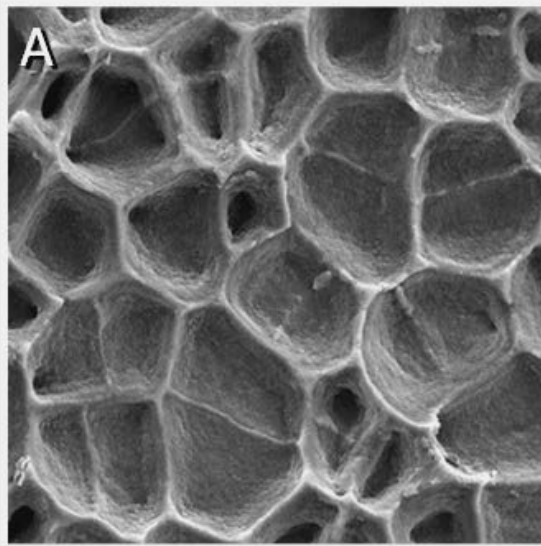


Planar Cell Surface Area in 'Golden Delicious'



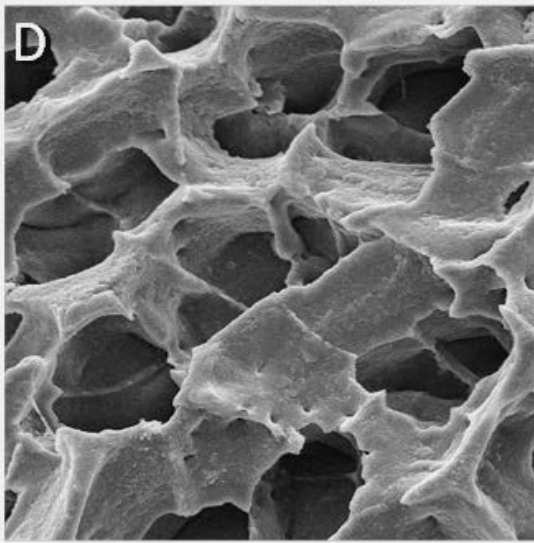
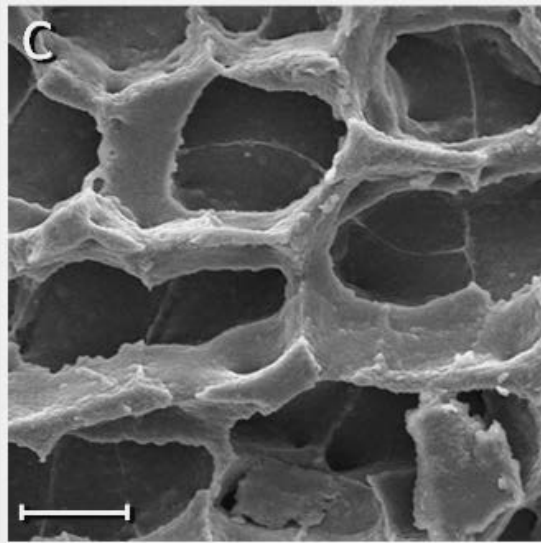
Interior surface (flesh side) of 'Golden Delicious' apple fruit cuticle

12 June



16 July

13 August



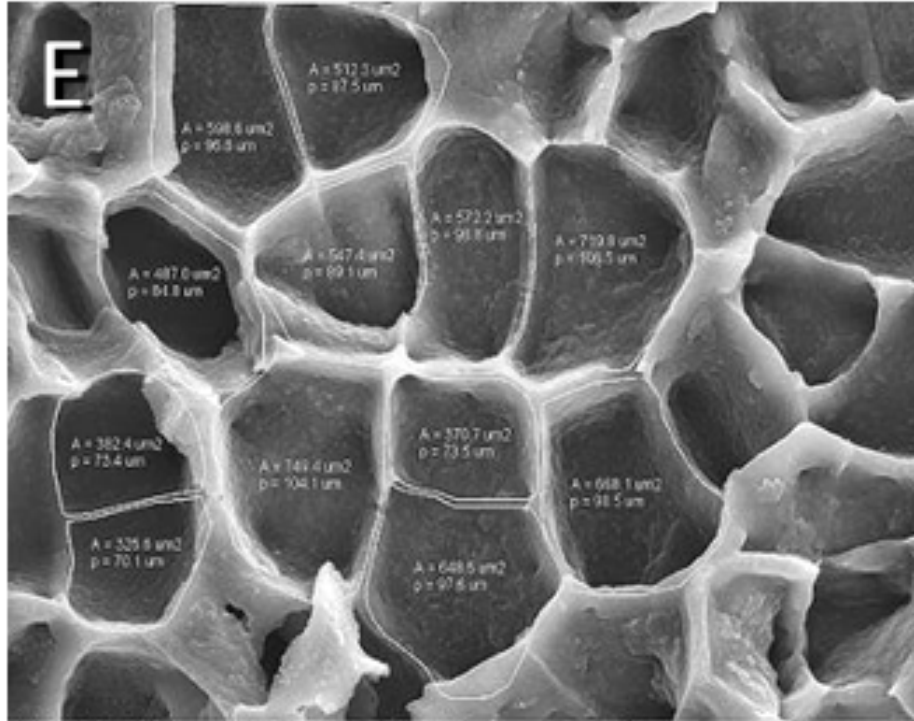
10 September

GA4+7

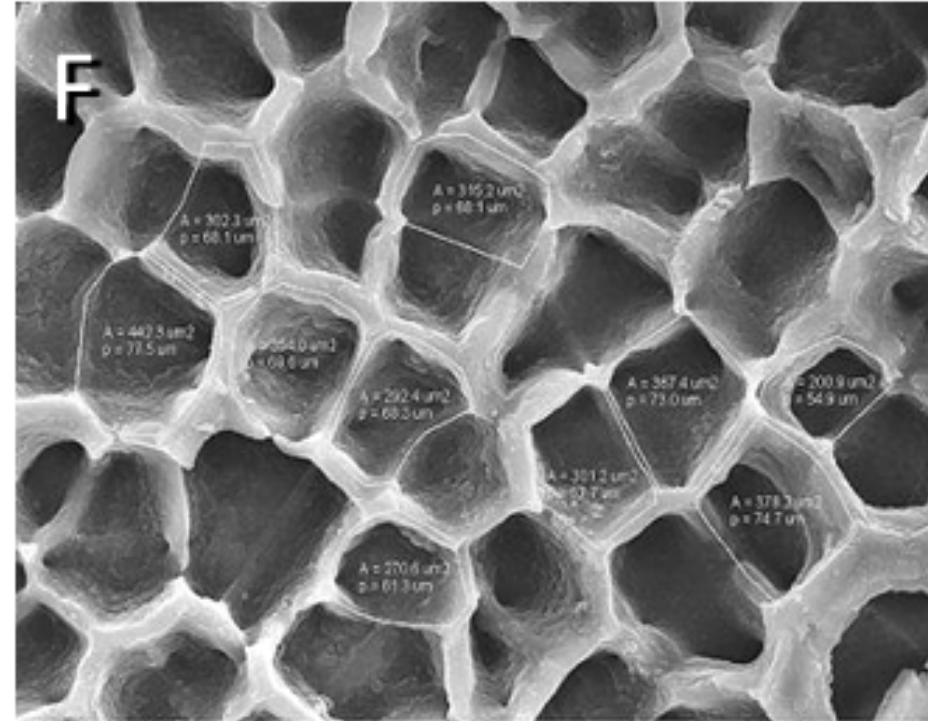
Stimulates Division of the Epidermal Cells in 'Golden Delicious'

Water (2000 cells per mm²)

GA4+7 (2500 cells per mm²)



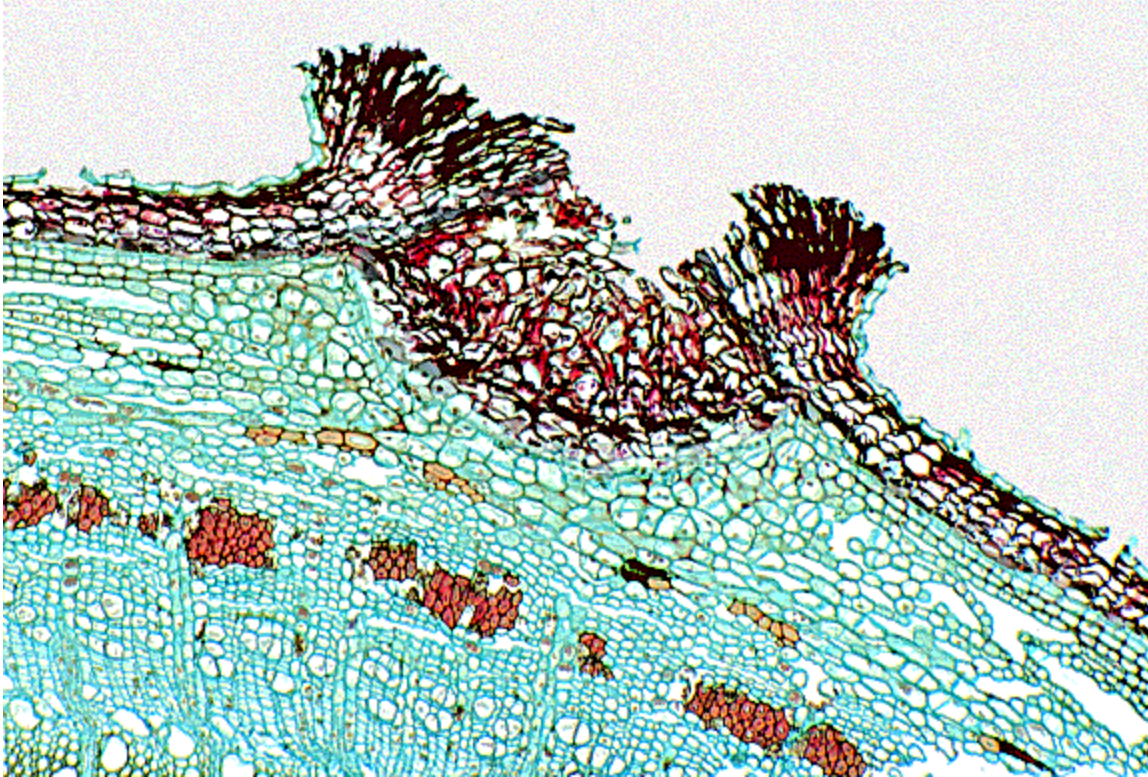
SEM MAG: 1.34 kx DET: SE Det + BSE De 50 μ



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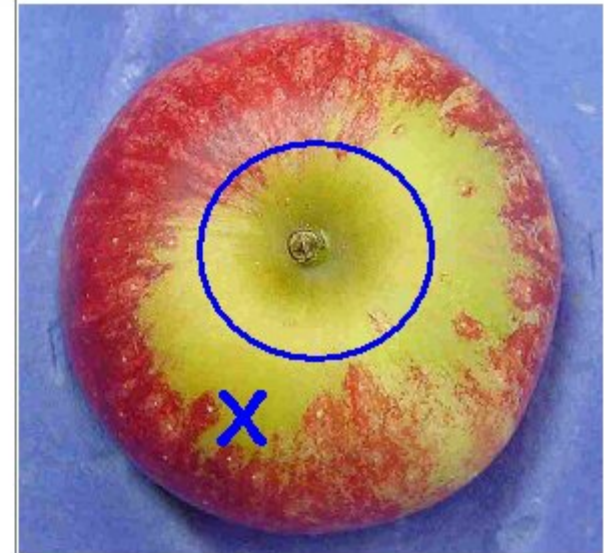
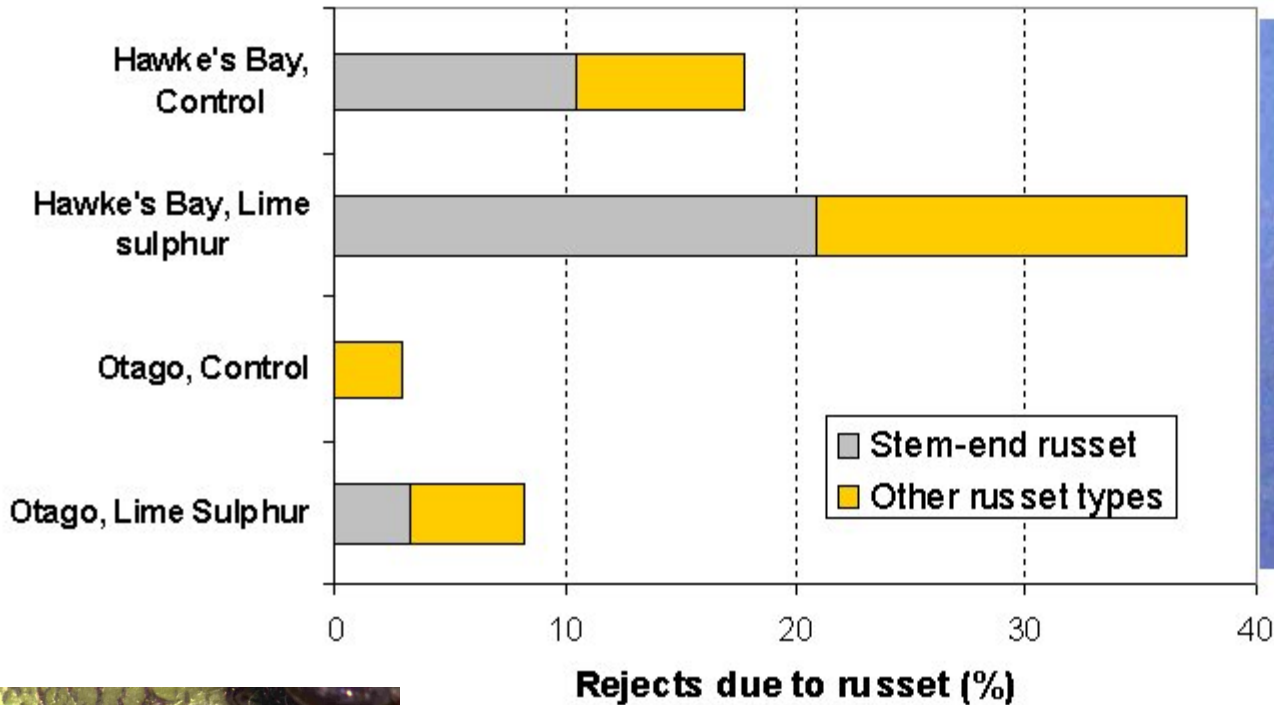
Fruits sampled 12 June

Russet Develops When the Sub Epidermal Layers are Exposed to Air



Environmental Conditions and Chemical Sprays Have Additive Effects on Russet

3 Applications of 2% Lime Sulfur as a bloom thinning spray

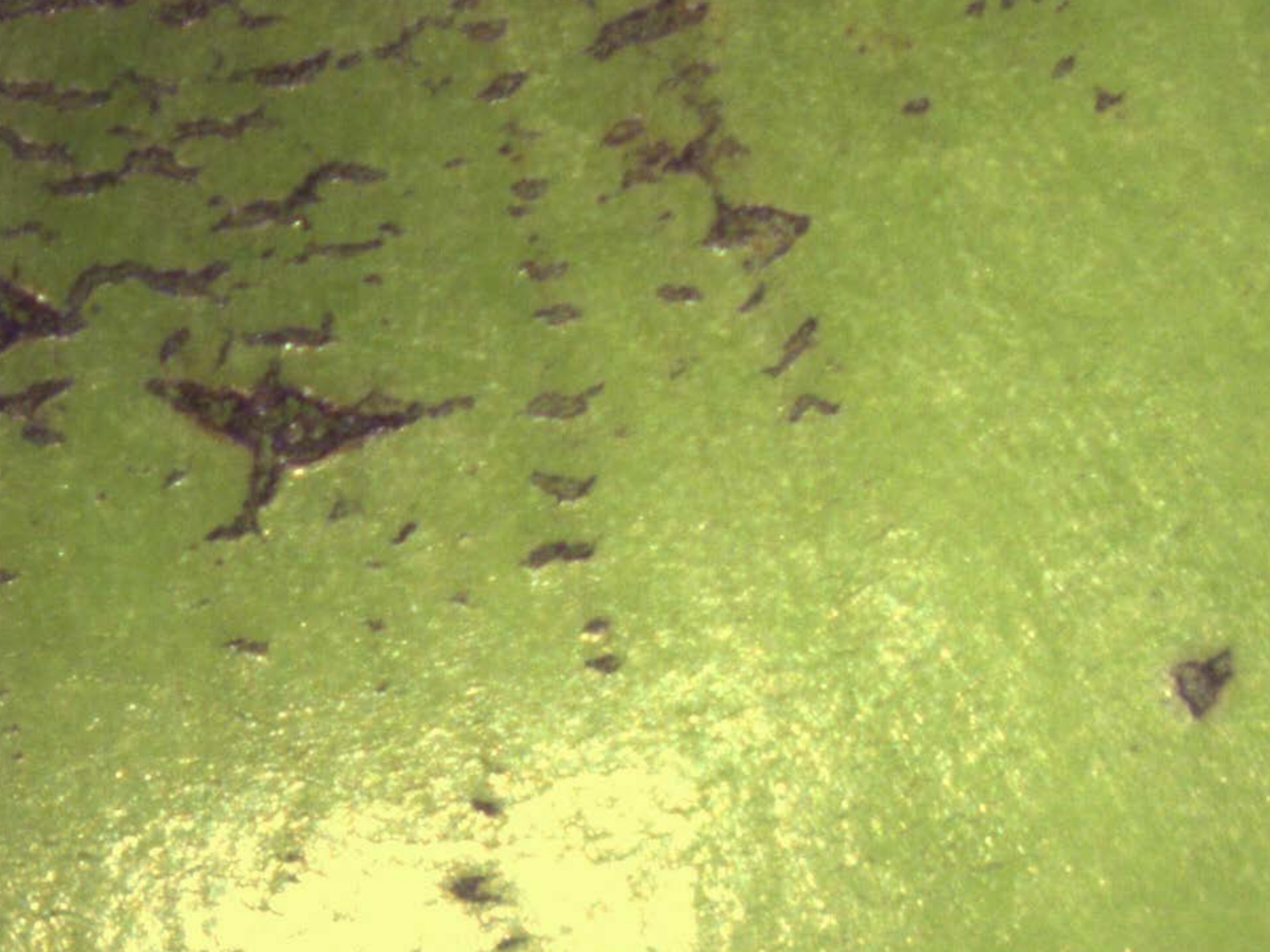


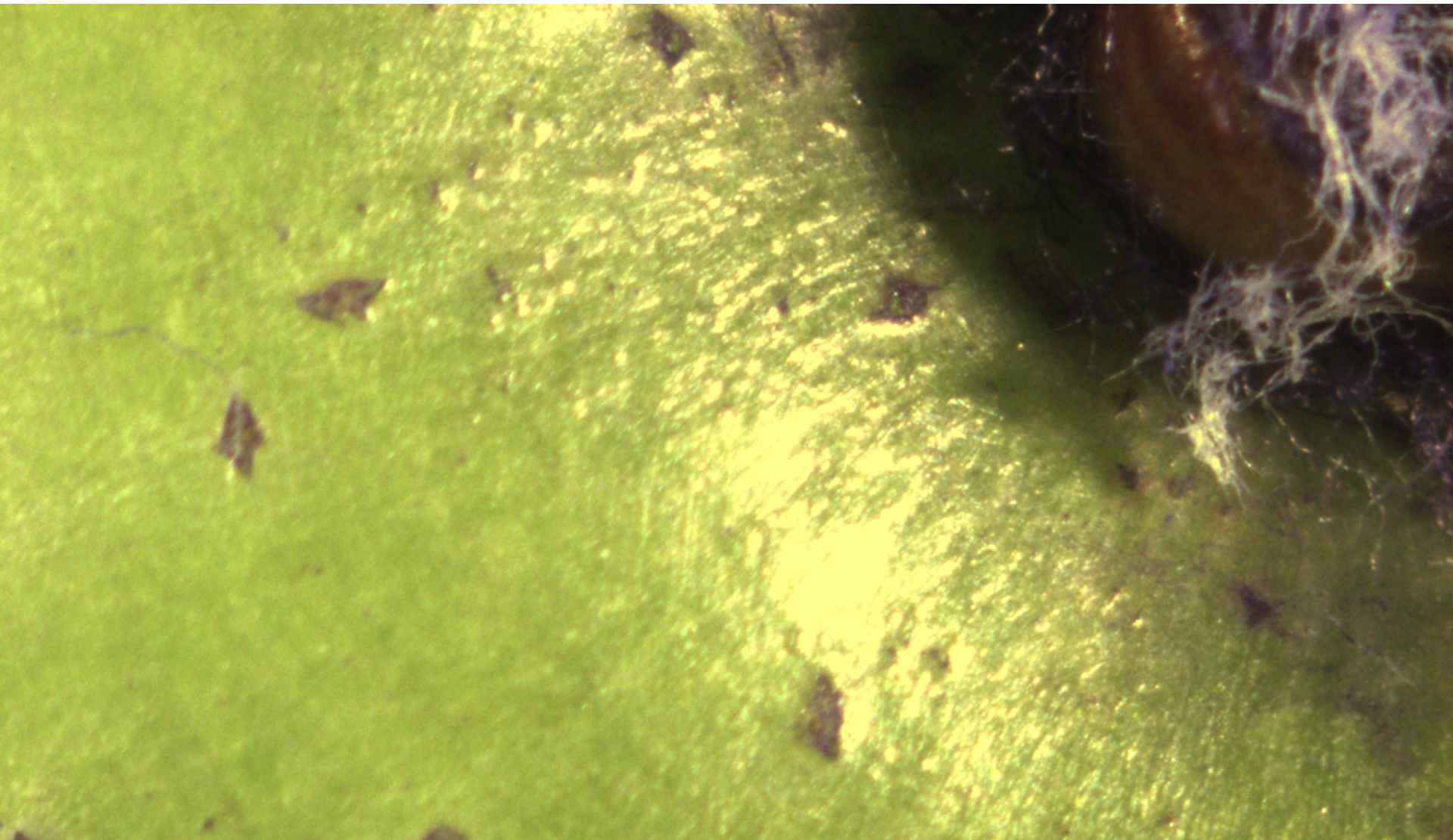
Reject line





Epicuticular waxes protect the fruit from desiccation, insect and physical damage, pathogen attack (?)





**Lenticels develop early, causing a break in the epicuticular waxes,
Exposure of hypodermal cells to air stimulates a wound response –
phellogen activation results in cork cell formation (russet)**



Rapid relative fruit expansion rates during the first few weeks after bloom can generate stress-fractures in areas where the cuticle is weak



Application of 'caustic' chemicals when the cuticle has been breached like this can increase russet incidence



Control

Pro Vide
+ Apogee
Regalis





Provide – To minimize fruit cracking

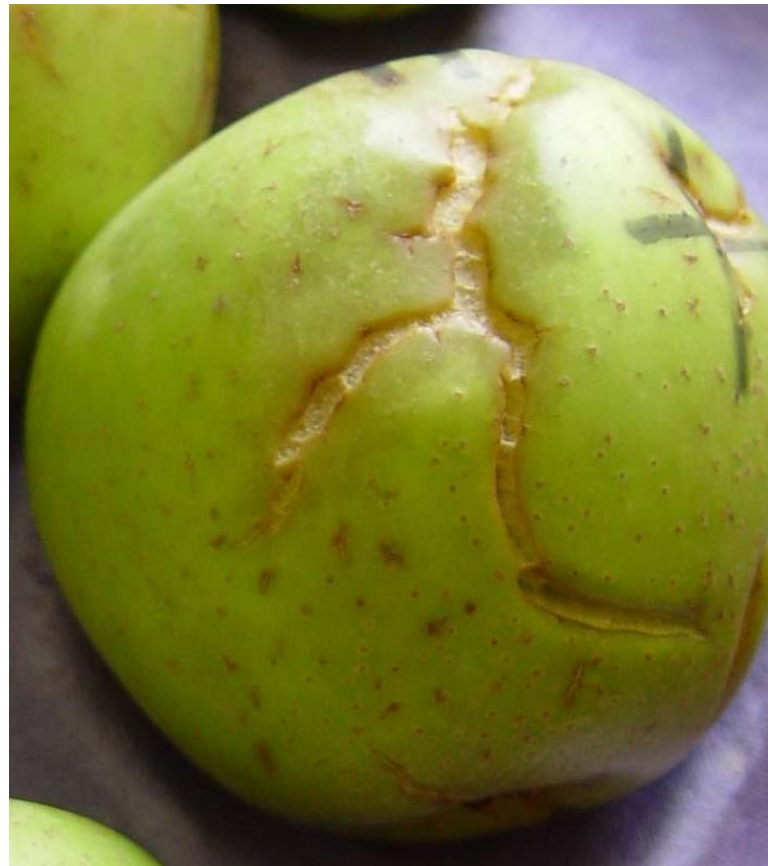
Rate: 1-2 pt/100gal

Water Volume: 50% TRV

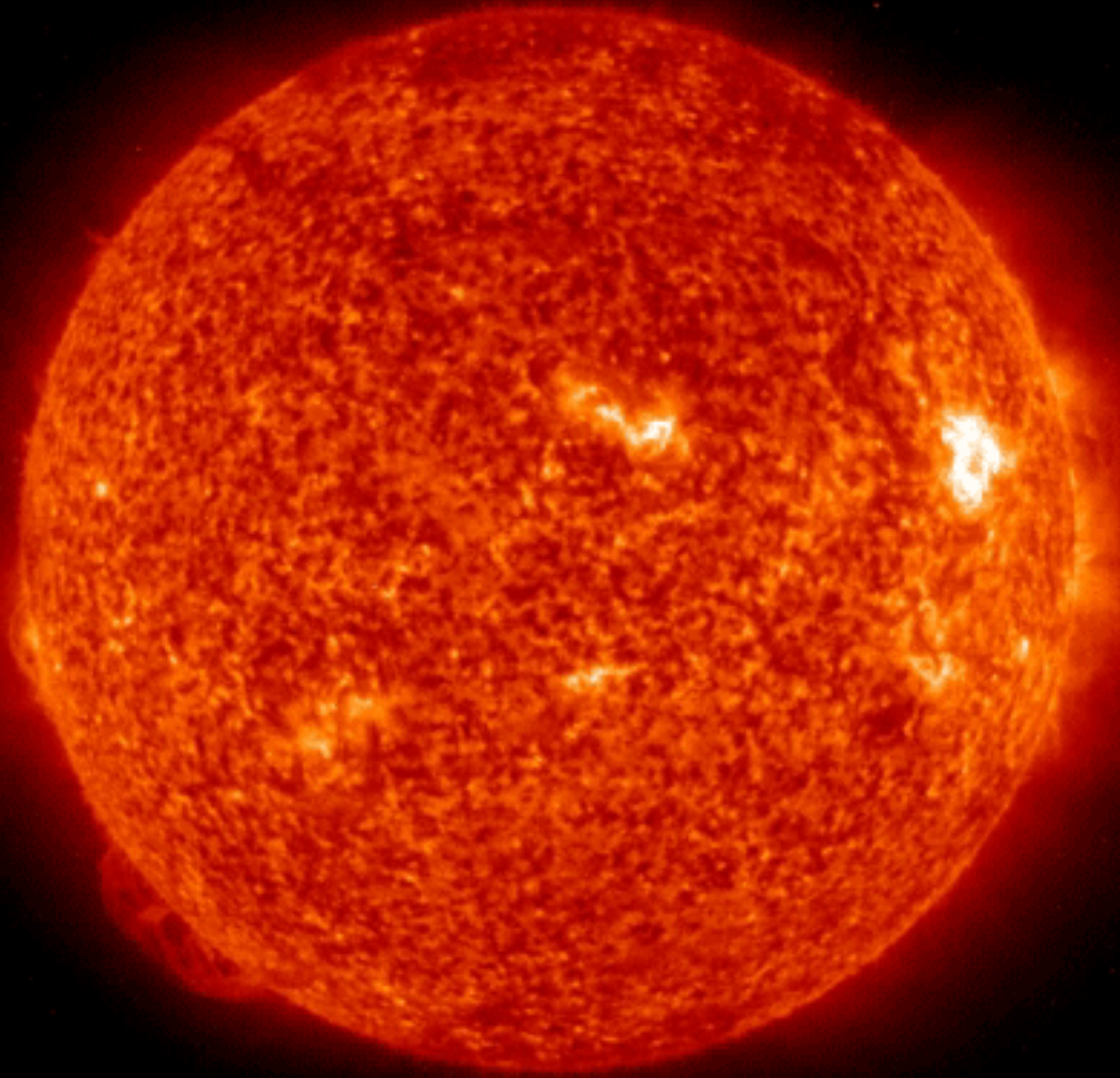
Timing: As soon as cracking begins and continue at 3 week intervals up to 3 weeks before harvest.



Provide Doesn't Stop GoldRush Cracking









The Sunburn Problem

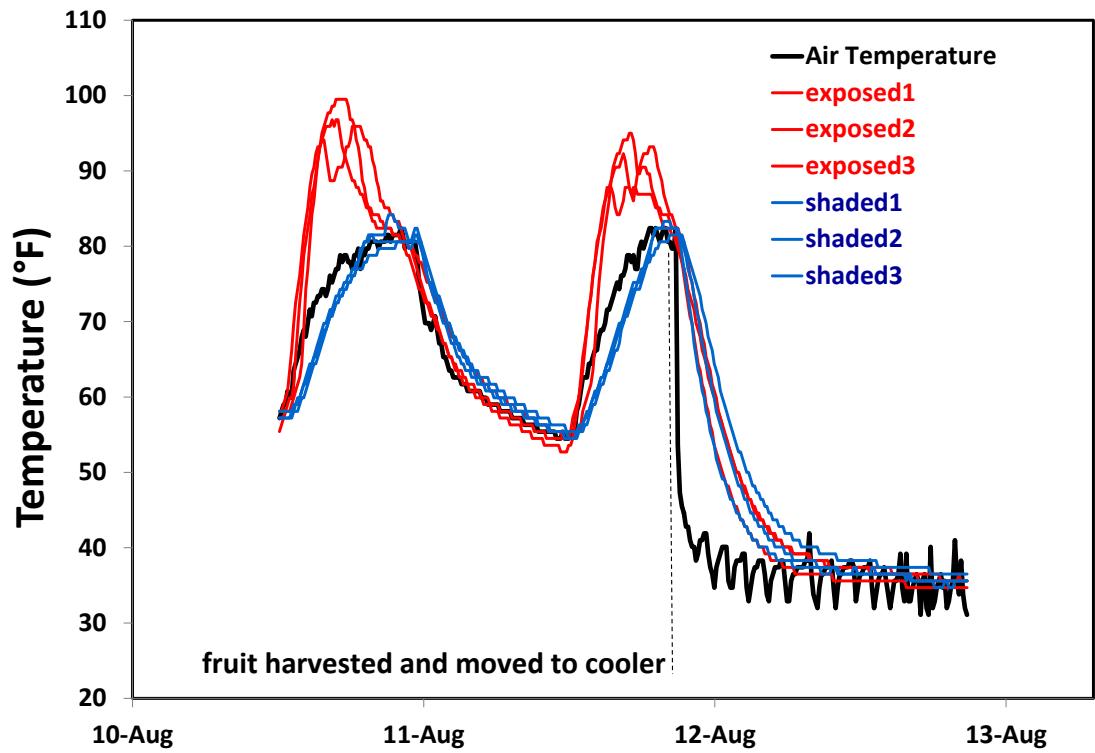
Causes

- **High fruit surface temperature**
 - FST can be up to 27 °F higher than air temperature
 - When air temp. is 86 °F then fruit temp can be 113 °F
- **Ultraviolet light (UV-B)**



Larry Schrader Sunburn Rating System

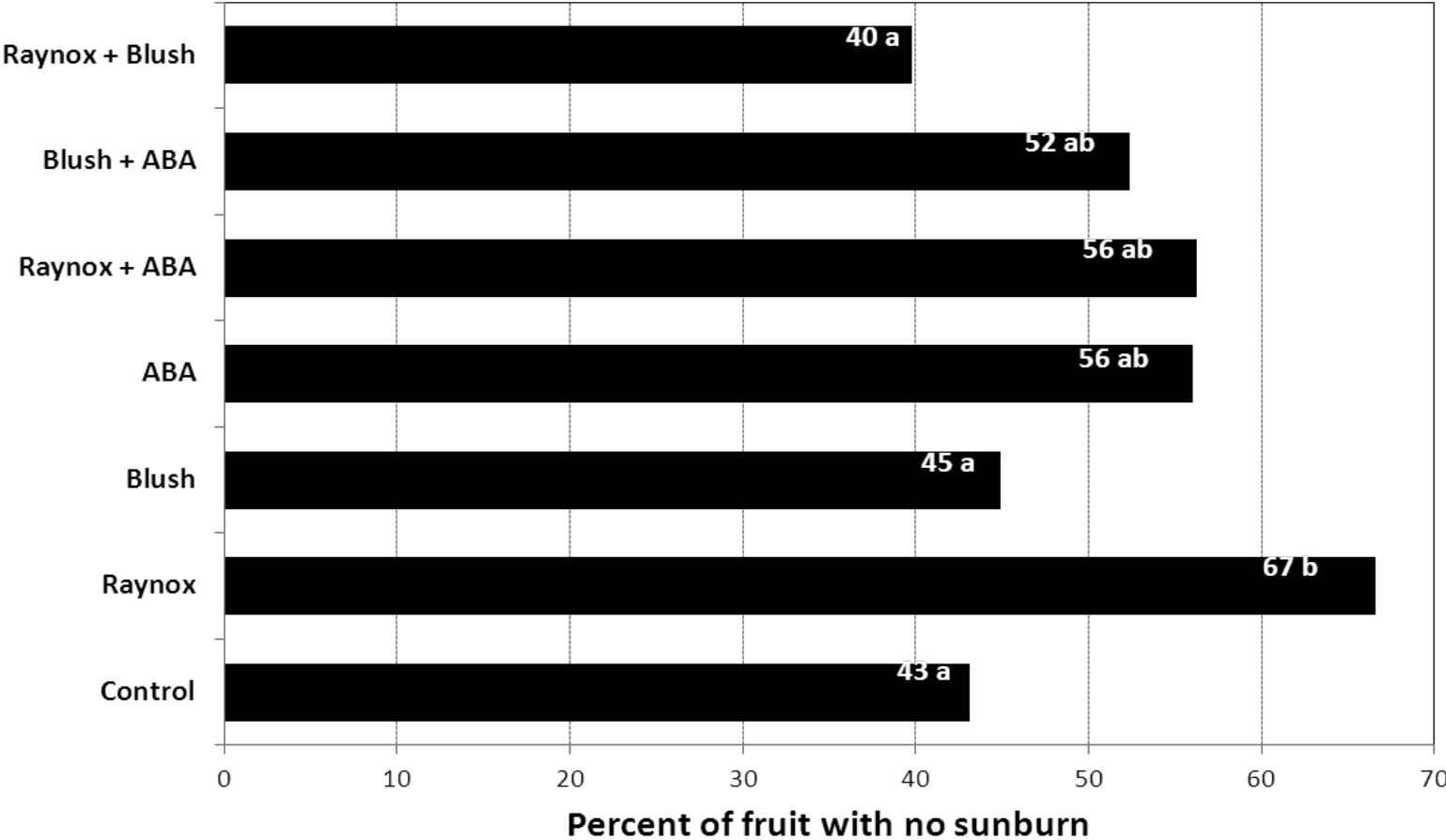




Fruit on the north side of the tree were a few degrees cooler than the air temperature in the morning

Fruit on the south side of the tree were up to 20 degrees warmer than air temperature

Effects of Raynox on Sunburn



Aztec Fuji (2011)

Aquilion
Ex: 35313
2.0
Se: 1/9
Im: 1/2
Sag: L0.0

UMC AQ64 ED

W 17
Acc: 5715
2011 Jul 30
Acq Tm: 13:47:21.150

512 x 512
FL03

S

120.0 kV
50.0 mA
Tilt: 0.0
2.4 s
Lin:DCM / Lin:DCM / Id:ID
W:140 L:90

P

DFOV: 25.6 x 25.6cm



